Bacteria Total Maximum Daily Load Studies for Hunting Creek, Cameron Run, and Holmes Run

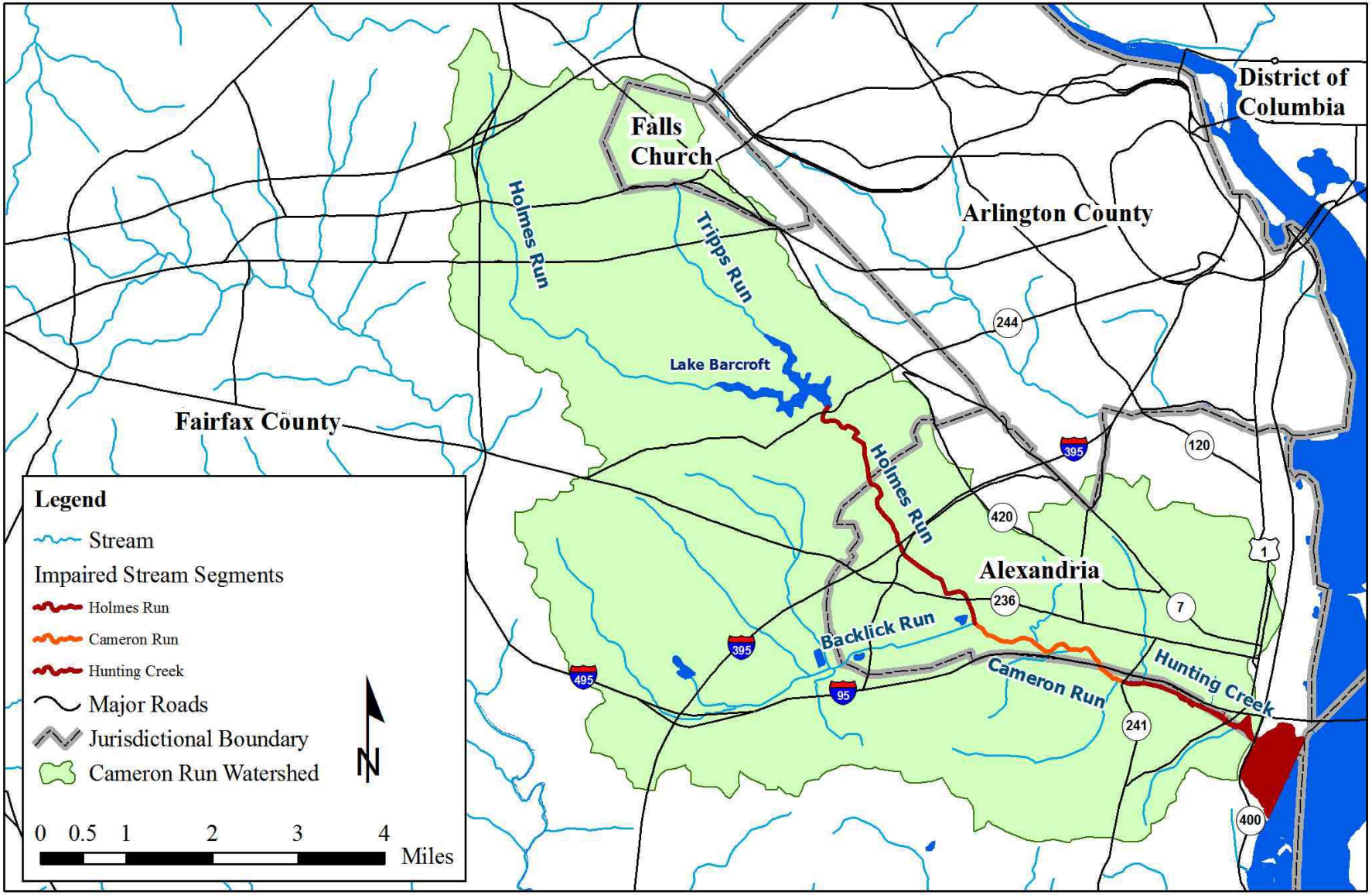
Public Meeting
March 25, 2009

Meeting Agenda

- **TMDL Overview**
  Katie Conaway, VA Department of Environmental Quality
- **Technical Approach for TMDL Development**
  Ross Mandel, Interstate Commission on the Potomac River Basin
- **Next Steps**
- **Questions**

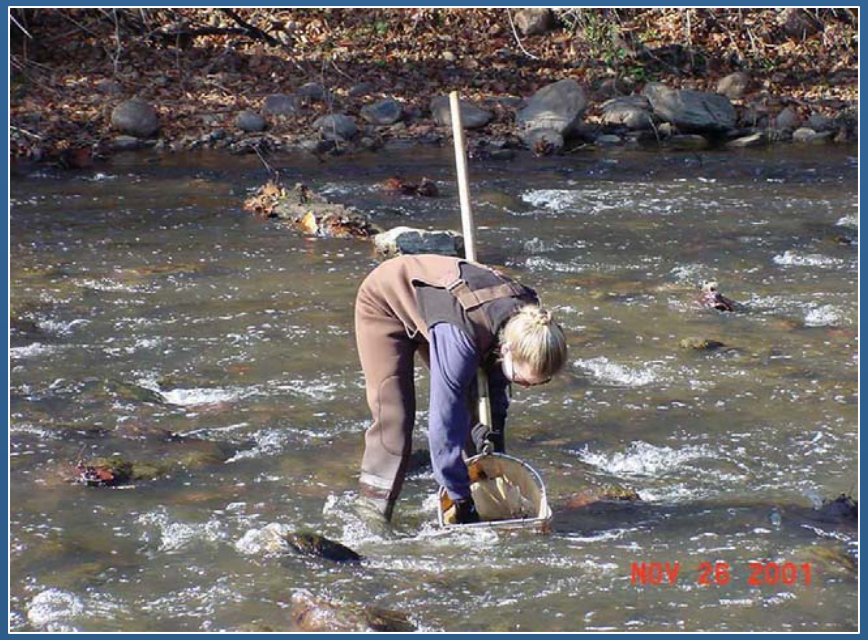
TMDL Background Information

Location of Impaired Segments



How do we know if water bodies in Virginia are healthy?

- Perform physical and chemical monitoring on water bodies throughout the state.
- Monitor parameters such as:
  - pH
  - Temperature
  - Dissolved Oxygen
  - Biological Community
  - Bacteria
  - Nutrients
  - Fish Tissues
  - Metals/Toxic Pollutants



What does DEQ do with the monitoring data that is collected?

Compare the data collected to the water quality standards.

Water Quality Standards:

- Regulations based on federal and state law.
- Set numeric and narrative limits on pollutants.
- Consist of designated use(s) and water quality criteria to protect the designated uses.

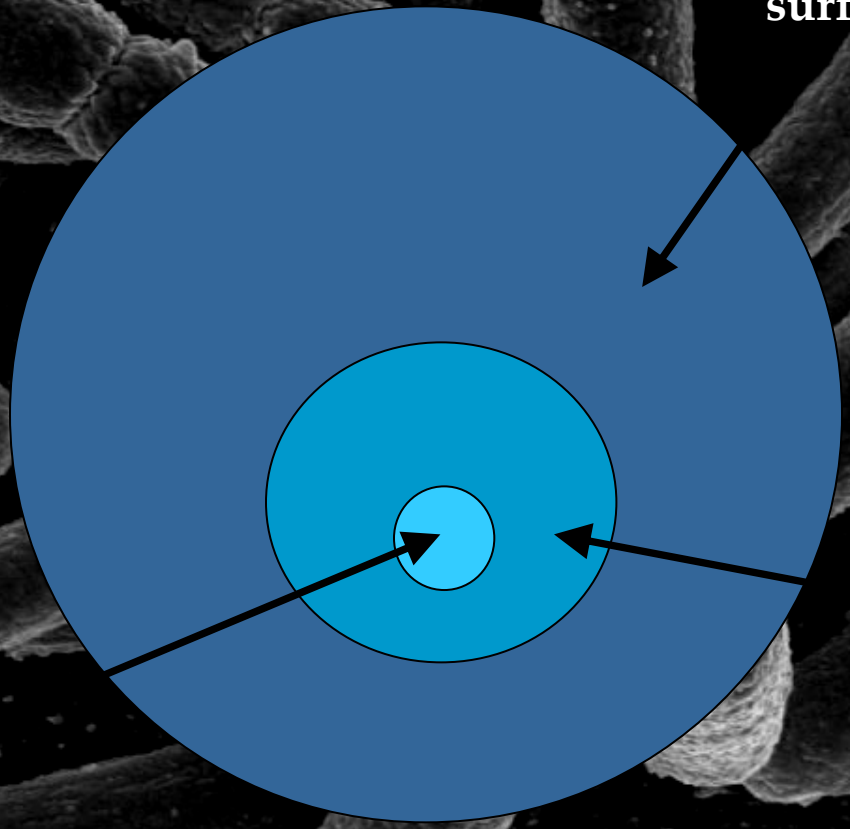
Designated Uses

- Recreational
- Public Water Supply
- Wildlife
- Fish Consumption
- Shellfish
- Aquatic Life

- The attainment of the recreational use is evaluated by testing for the presence of *E. coli* bacteria.

Recreational Use Impairment
What are Fecal Coliform and *E. coli* Bacteria?

Coliform Bacteria:
Commonly found in soil, decaying vegetation, animal feces, and raw surface water



Fecal Coliform:
- Found in the digestive tract of humans and warm blooded animals
- Indicator of the potential presence of pathogens in water bodies

Escherichia coli:
- Subset of fecal coliform bacteria
- Correlate better with swimming associated illness

Potential Sources of Fecal Coliform Bacteria

What happens when a water body doesn't meet water quality standards?

- Waterbody is listed as "impaired" and placed on the 303(d) list.
- Once a water body is listed as impaired, a Total Maximum Daily Load value must be developed for that impaired stream segment to address the designated use impairment.
- TMDL Studies are required by law:
  - 1972 Clean Water Act (CWA)
  - 1997 Water Quality Monitoring Information and Restoration Act (WQMIRA)

What is a TMDL ?

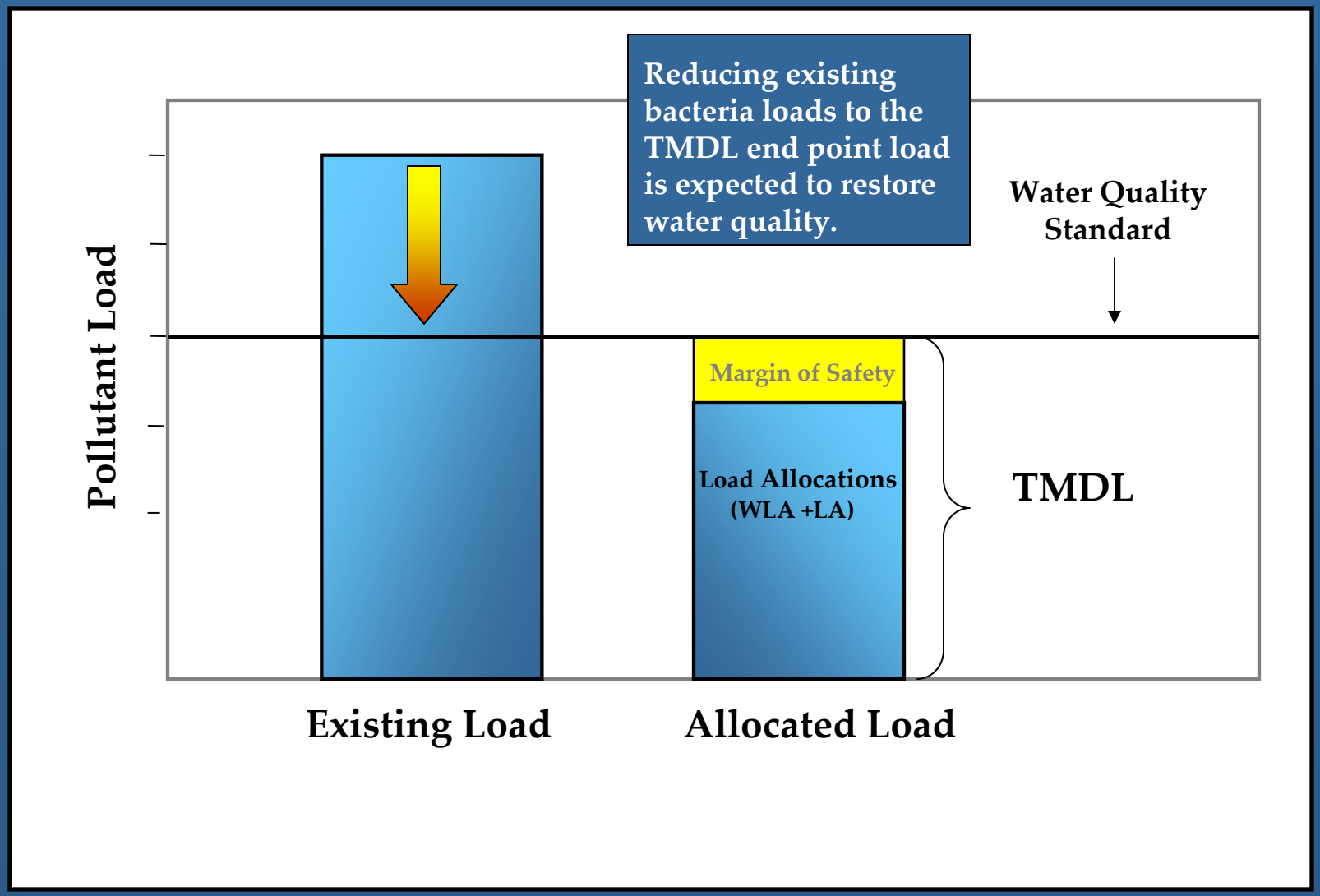
Total Maximum Daily Load

TMDL = Sum of WLA + Sum of LA + MOS

Where:

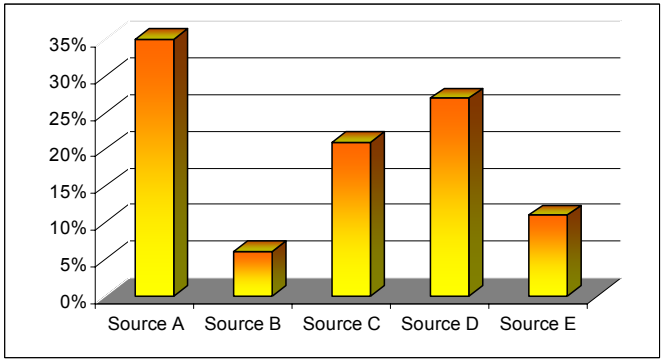
TMDL = Total Maximum Daily Load
WLA = Waste Load Allocation (point sources)
LA = Load Allocation (nonpoint sources)
MOS = Margin of Safety

An Example TMDL



We are here

TMDL Study

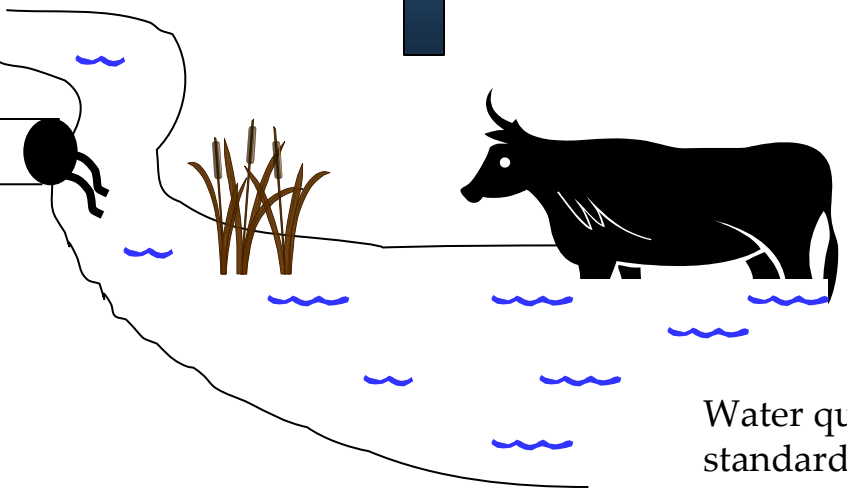


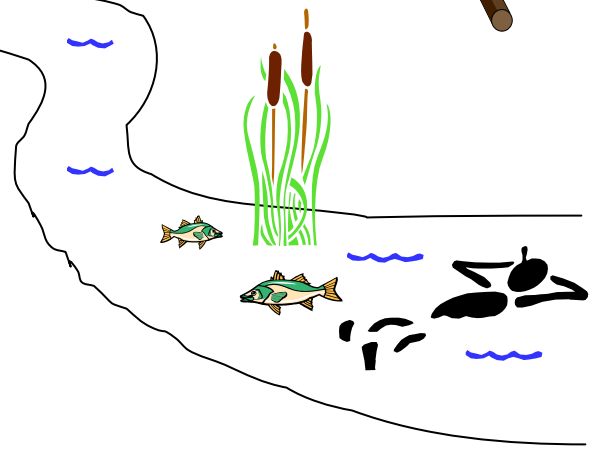
Implementation Plan

DCR

Implementation

Monitoring





Water quality standards not met

Questions?

TMDL Development Methodology

Step 1 - Data Collection and Watershed Assessment

Step 2 - Source Assessment

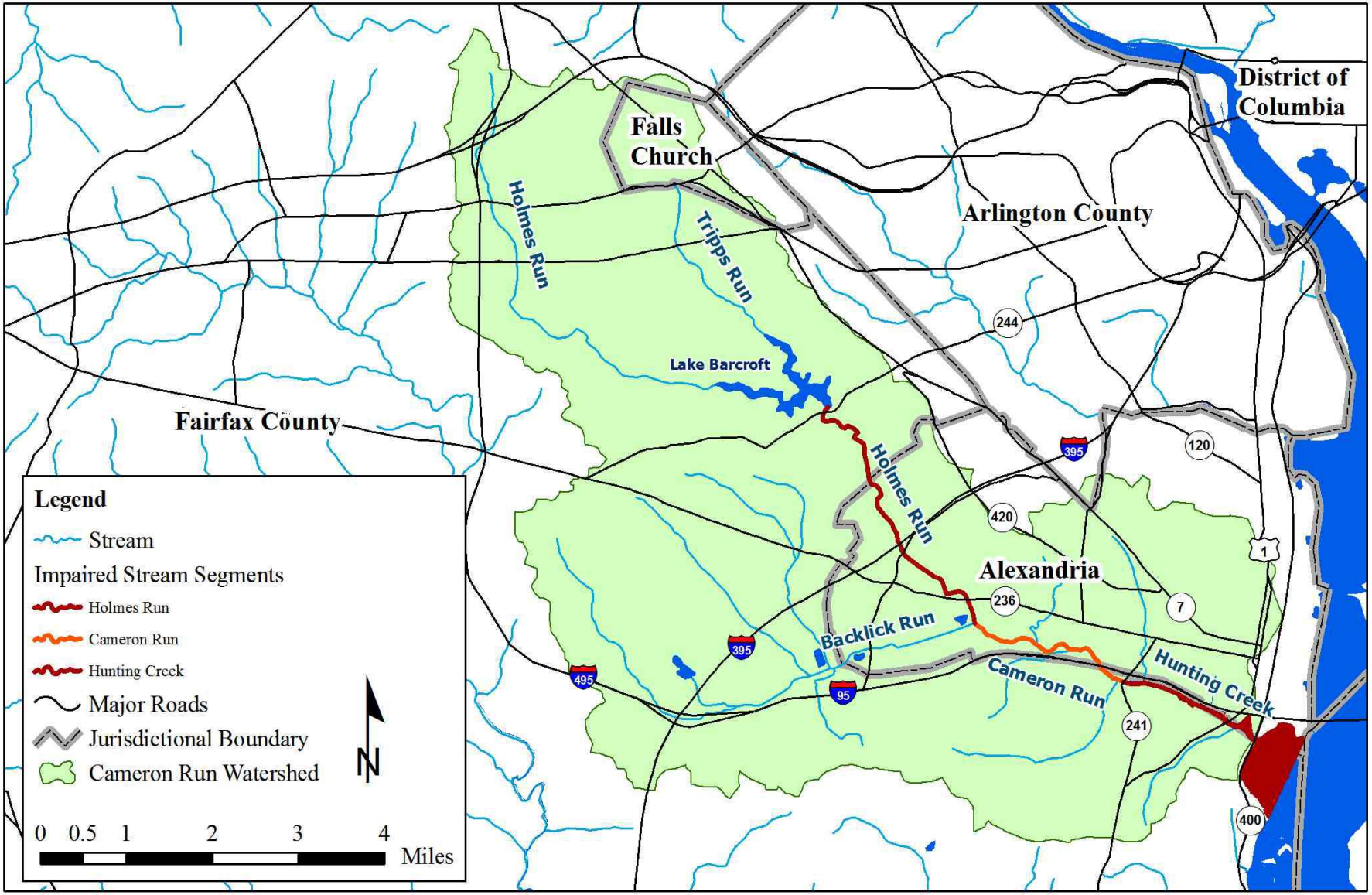
Step 3 - Computer Modeling

Step 4 - Determine Required Reductions by Source

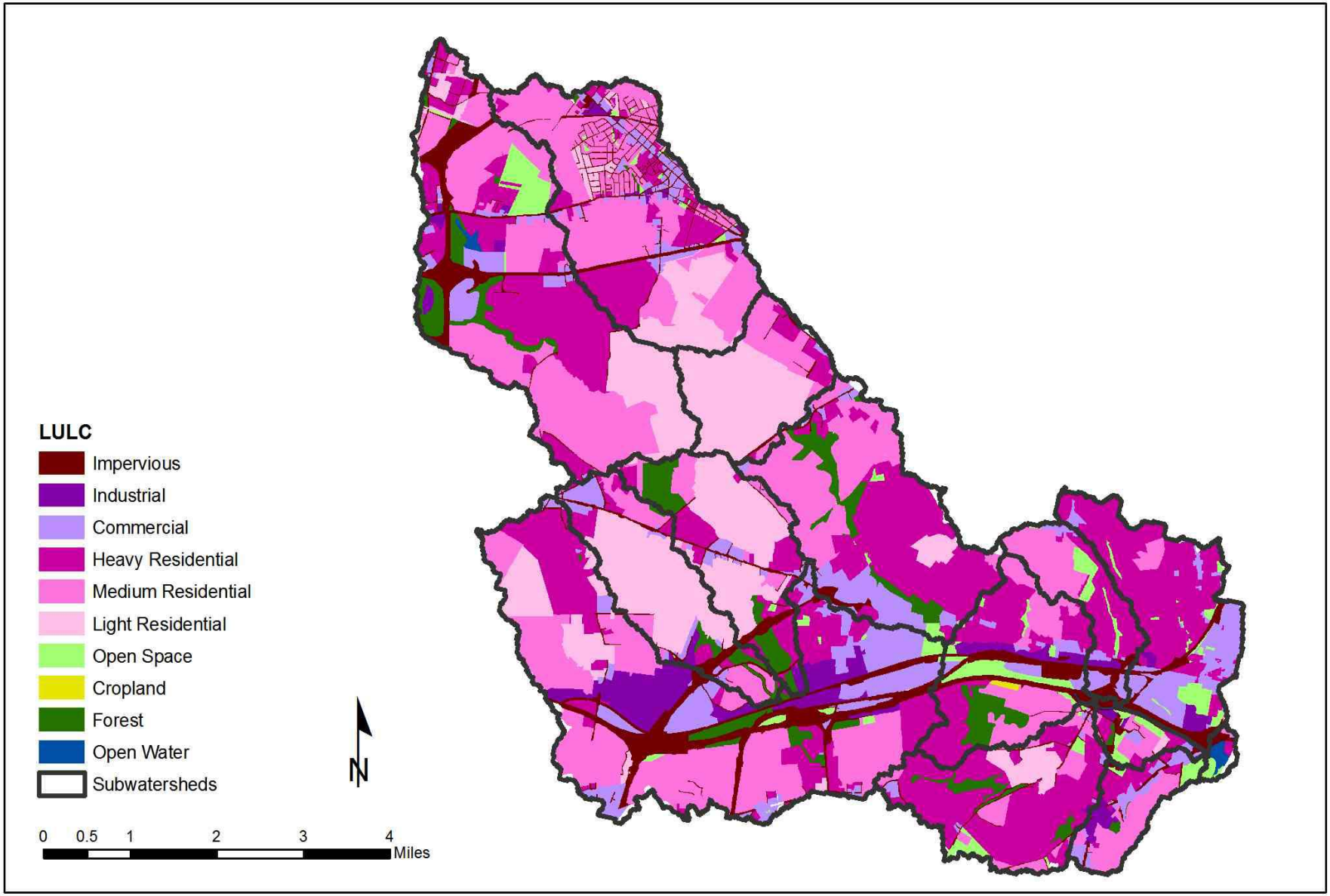
Step 1

Data Collection and Watershed Assessment

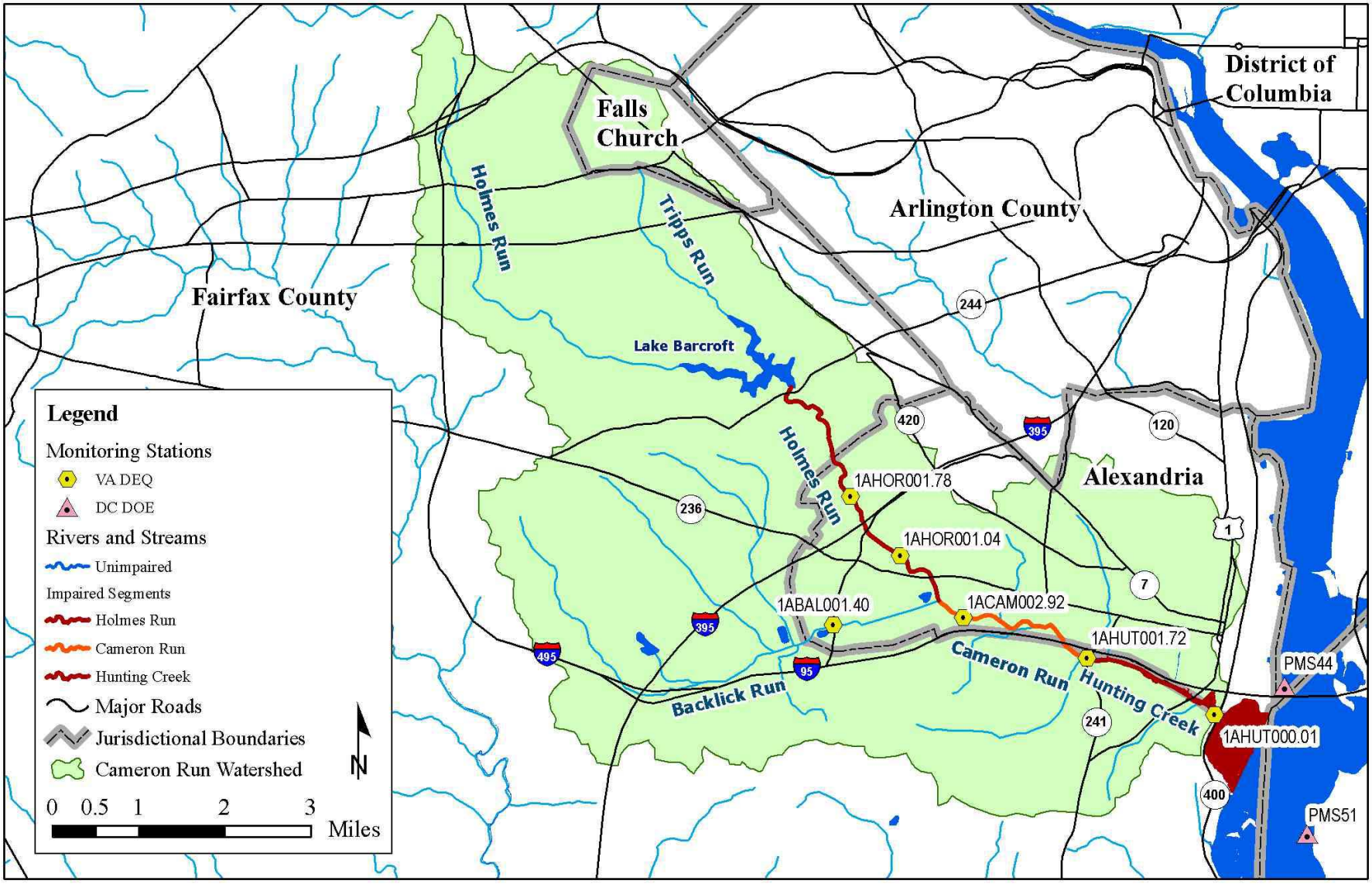
Location of Impaired Segments



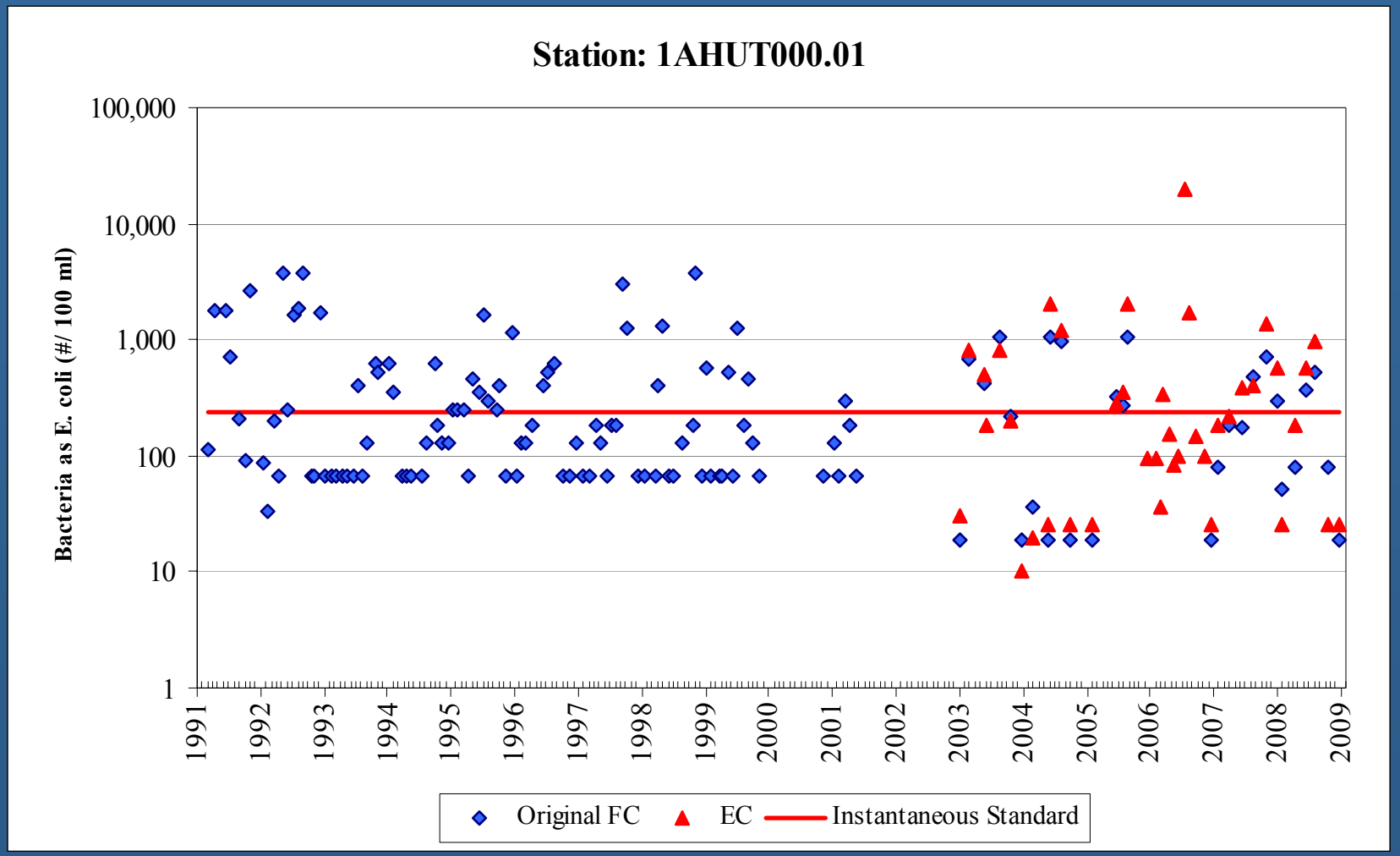
Land Use


LULC
Impervious
Industrial
Commercial
Heavy Residential
Medium Residential
Light Residential
Open Space
Cropland
Forest
Open Water
Subwatersheds
N
0 0.5 1 2 3 4
Miles

Monitoring Station Locations

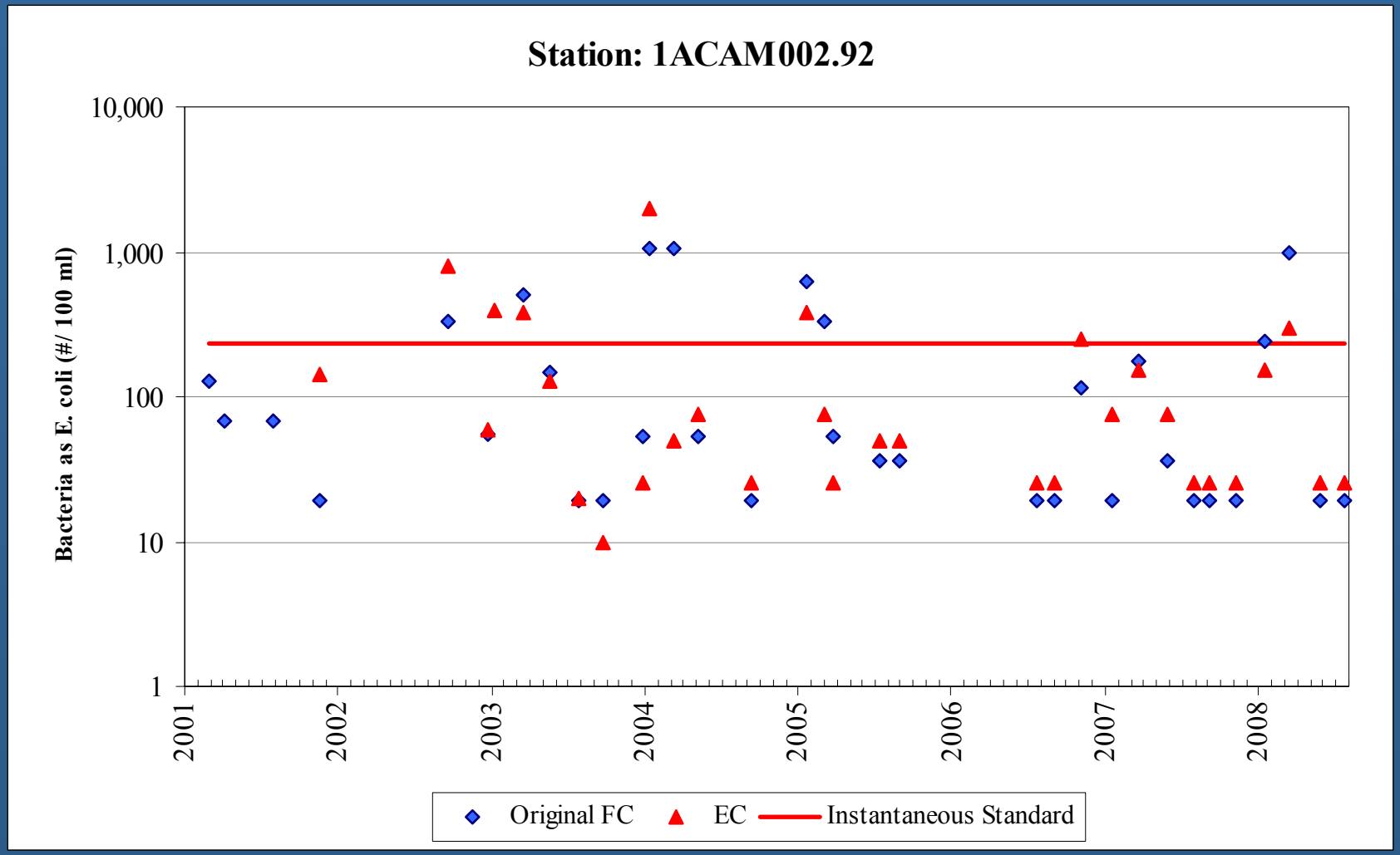


Bacteria Monitoring Data Equivalent *E. Coli* Concentration for Hunting Creek



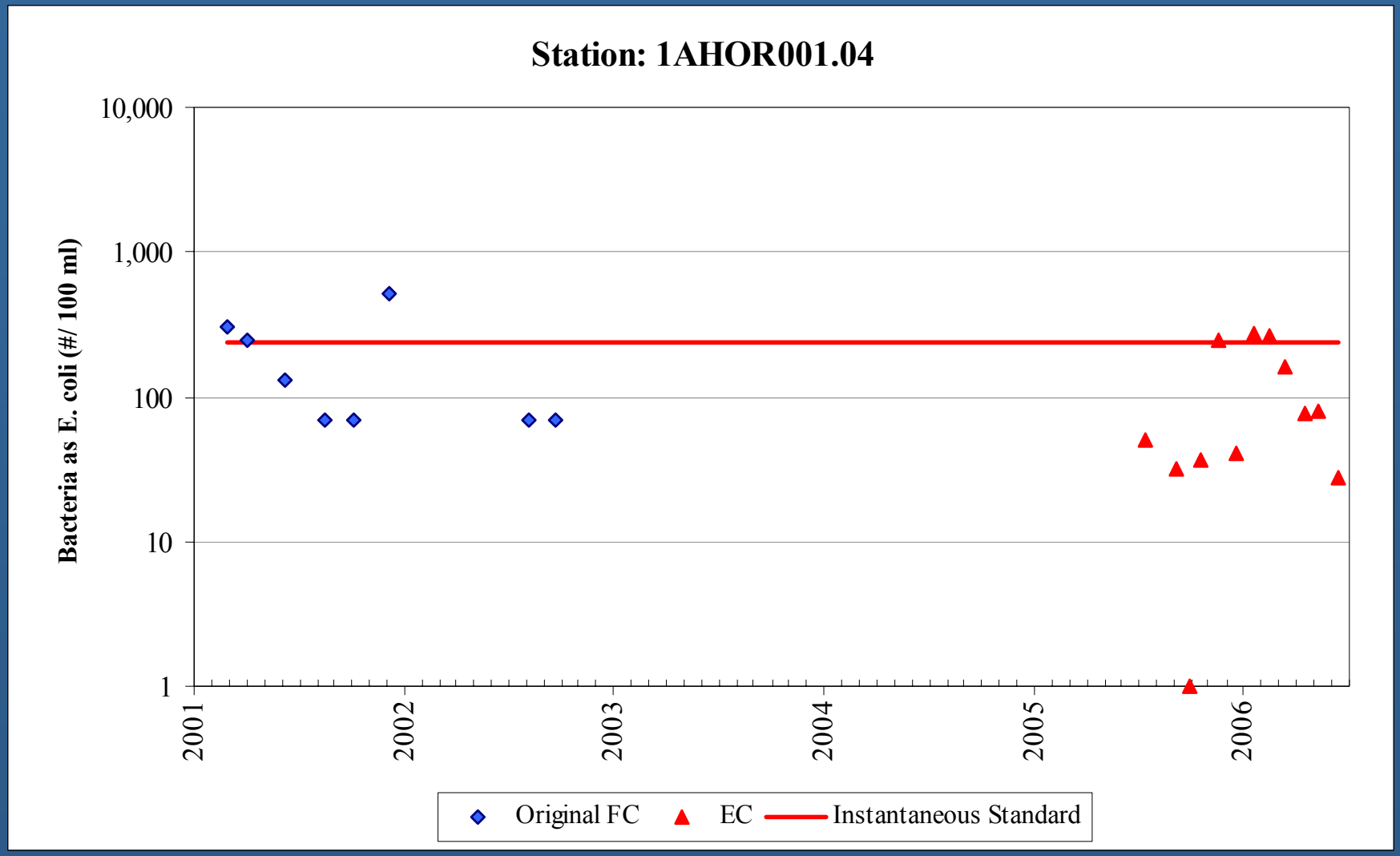
$\log_2 EC = -0.0172 + 0.91905 * \log_2 FC$

Bacteria Monitoring Data Equivalent *E. Coli* Concentration for Cameron Run



$\log_2 EC = -0.0172 + 0.91905 * \log_2 FC$

Bacteria Monitoring Data Equivalent *E. Coli* Concentration for Holmes Run



$\log_2 EC = -0.0172 + 0.91905 * \log_2 FC$

Step 2

Source Assessment

Basis of Source Assessment

- Species Bacteria Production
  - Studies in Scientific Literature
- Habitat
  - Naturalists Opinion; GIS Studies
- Bacteria Source Tracking (BST)
  – Genetic "Fingerprinting" or Antibiotic Resistance

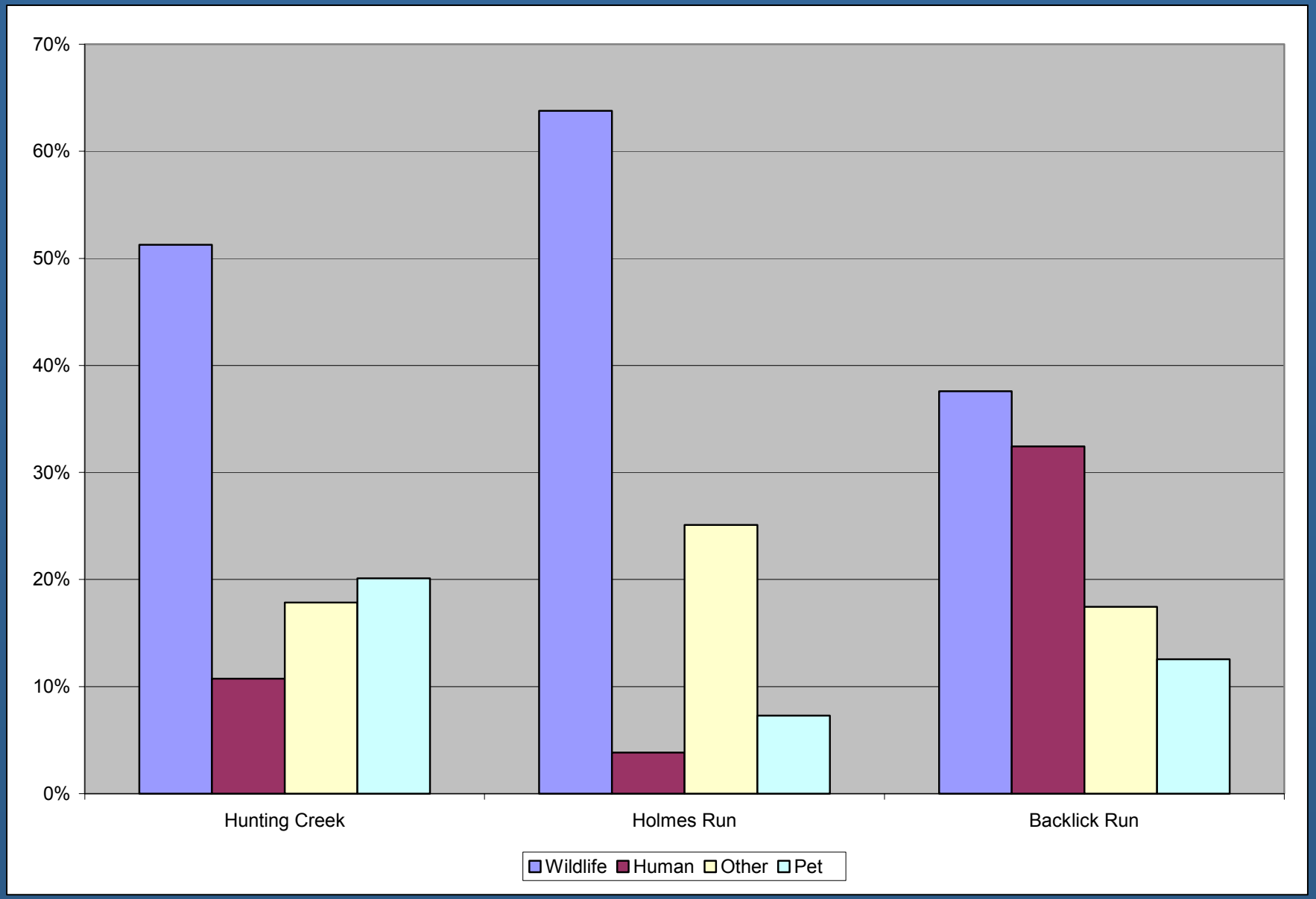
Sources of Bacteria in Impaired Watersheds

- Alexandria Combined Sewer System (CSS)
- Alexandria Waste Water Treatment Plant
- Maryland Boundary
- Cameron Run Drainage
  - Wildlife
  - Human
  - Pets
  - Other

Other Permitted Sources

- Fairfax, Alexandria, Falls Church, and Arlington Municipal Separate Storm Sewer Systems (MS4)
- VDOT
- George Washington Memorial Parkway
- Fairfax County Public Schools

Bacteria Source Tracking (BST) Results



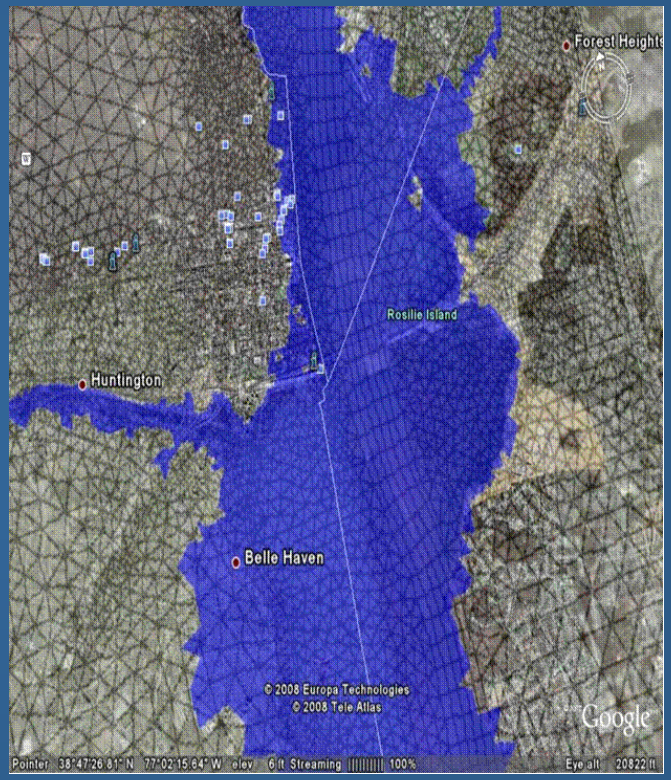
Step 3
Computer Modeling

What is a Model?

- Tool used to simulate real world situations.
- Helps make predictions (weather forecasts, population growth, etc.)
- Enter known information/conditions into the model, and the model predicts the unknown.

The Role of Models in TMDL Development

- **Models Used:**
  - Non Tidal Model (HSPF)
  - Tidal Model (ELCIRC)
- **Model Inputs**
  - Hydrological Data
  - Water Quality Data
- **Model Results**
  - Predict water quality conditions at all times.
  - Determine required pollutant reductions necessary to meet water quality standards.



Step 4
Determine Required Reductions by Source

Determine Reductions Required to Meet Water Quality Standards

Bacteria Loadings

Simulated Concentrations

Compare with Water Quality Standards

Are water quality standards met?

Yes

No

Reduce Bacteria Loadings

Project Tasks and Milestones

Hunting Creek/Cameron Run/Holmes Run Bacteria TMDL Studies	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10
Data Gathering	■	■	■	■	■											
TAC Meeting #1			■													
Public Meeting #1			■													
ELCIRC Model Setup			■	■	■											
HSPF Setup/Calibration			■	■	■											
TAC Meeting #2						■										
ELCIRC Model Calibration						■	■	■	■							
TAC Meeting #3										■						
Develop TMDL Scenarios										■	■	■	■			
TAC Meeting #4													■			
Prepare TMDL Reports													■	■		
Public Meeting #2														■		
Draft TMDL for Review															■	
Submit Draft Report to EPA																■

**Dates are subject to change. TAC Meetings can be added or removed, depending on project needs.*

Comment Period

Comment Period for Materials Presented at the Public Meeting:

- **March 25, 2009 to April 24, 2009**
- **Comments should be submitted in writing to:**

Katie Conaway
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13901 Crown Court, Woodbridge, VA 22193

CONTACTS

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Additional Information

Water Quality in Hunting Creek, Cameron Run, and Holmes Run

- **Hunting Creek, Cameron Run, and portions of Holmes Run do not meet the water quality standards recreational use.**

Stream Name	Area	Upstream Limit	Downstream Limit	DEQ Monitoring Stations	Exceedance Rate*
Hunting Creek (Tidal)	0.53 square miles	Route 241 (Telegraph Road) Bridge Crossing	Confluence with the Potomac River	**Station 1aHUT000.01** *(Located at the George Washington Memorial Parkway)*	**11 of 17 samples** *(40.7% exceedance)*
				Station 1aHUT001.72 *(Located at Telegraph Road)*	**3 of 11 samples** *(27.3% exceedance)*
Cameron Run (Non-Tidal)	2.08 miles	Confluence with Backlick Run	Route 241 (Telegraph Road) Bridge Crossing	**Station 1aCAM002.92** *(Located at Eisenhower Avenue)*	**5 of 18 samples** *(27.8% exceedance)*
Holmes Run (Non-Tidal)	3.58 miles	Mouth of Lake Barcroft	Confluence with Backlick Run	**Station 1aHOR001.04** *(Located at Pickett Street)*	**3 of 12 samples** *(25% exceedance)*

- **The attainment of the recreational water quality standard use is assessed using E. coli bacteria criteria:**

Indicator	Single Sample Maximum (cfu/100mL)	Geometric Mean (cfu/100mL)
E. coli	235	126

** Exceedance rates taken from the 2008 Integrated Assessment, which looked at data from 01/01/2001 to 12/31/2006.*